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ABSTRACT

Developed for desert gardeners and farmers, the guide describes "kaicka" (the storing of seeds)--seed saving the Papago-Pima way. Setting the mood for the document, the introductory material contains the story of kaicka via a dialog between a child and his grandfather (presented in Papago and English). The additional sections which make use of examples and stories (with Papago-Pima vocabulary interspersed and translated) teach the lessons concerning cultural preservation through seed care and handling. Sections include: "Saving What Our Ancestors Gave Us"; "Seed Storage Problems"; "Traditional Seed Saving Practices"; "Selecting Seeds from the Best Plants You Can Find"; "Cleaning, Threshing and Drying Seeds (Corn; Beans and Peas; How to Make a Flail; Squash, Melons, and Gourds; Wheat and Other Small Grains; Chiles)"; "Storing Seeds at Home"; "How Long Can Seeds Be Kept and Still Be Good for Planting?"; "Germination Tests: Checking to See if Seed Will Sprout"; "Names for Papago-Pima Crops"; and "Off-Reservation Sources of the Old Kinds of Seeds." The section dealing with the names for Papago-Pima crops contains the English, Papago, Spanish, and scientific names for the crops, and the section on off-reservation sources contains seven addresses of places to write for more information about special kinds of seeds that the "Old People" used to have. Concluding the guide is a list of further readings. (AH)

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KAICKA

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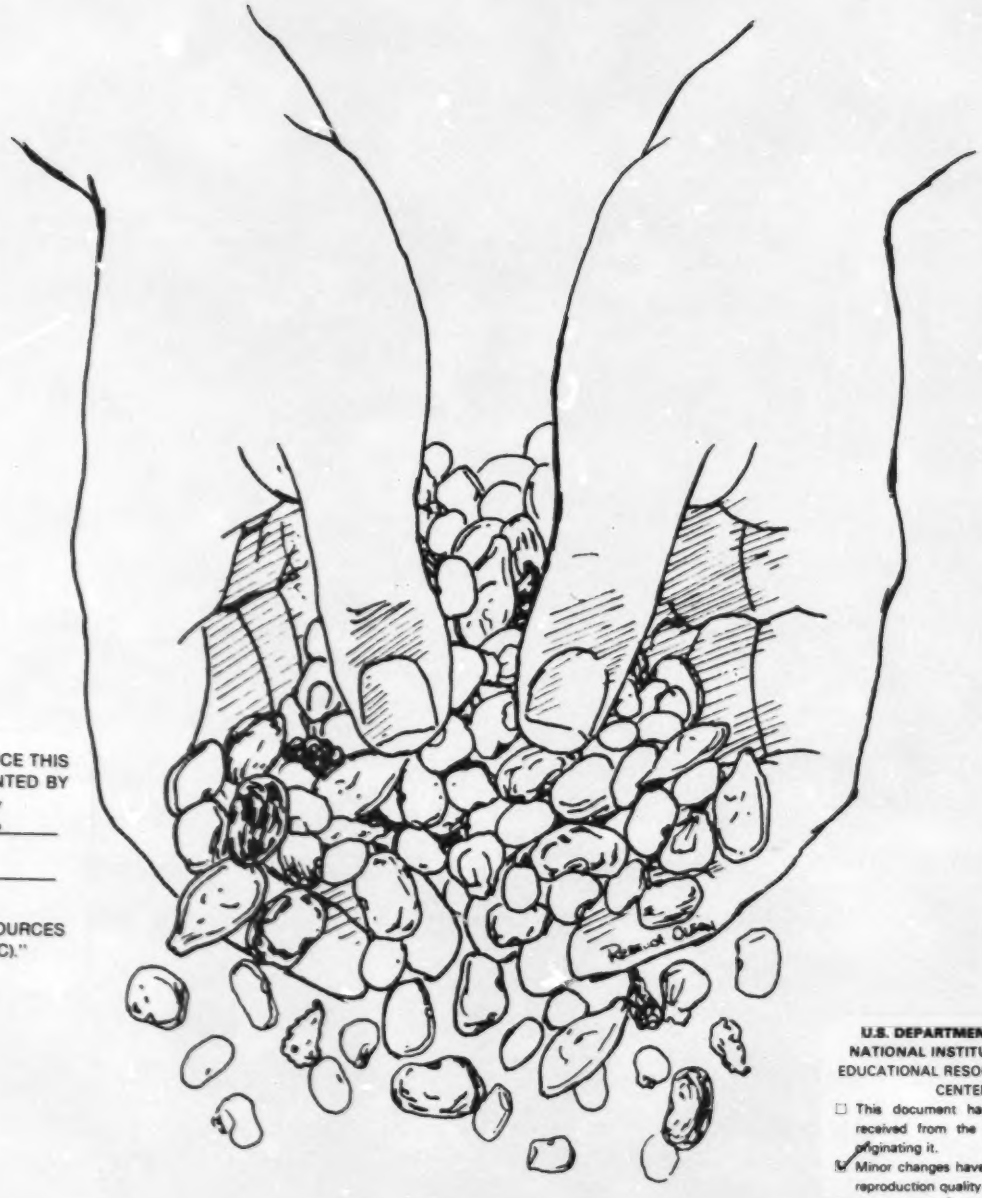

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Seed Saving the Papago-Pima Way

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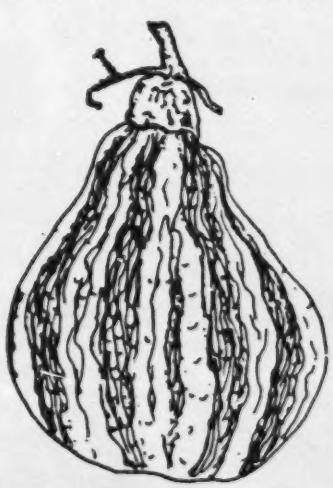
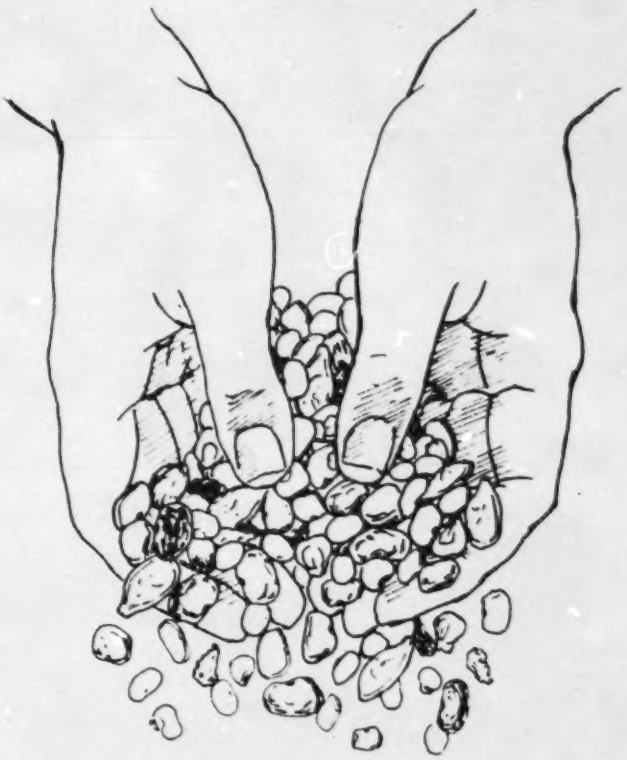


KAICKA

Seed Saving the Papago-Pima Way

A GUIDE FOR DESERT GARDENERS AND FARMERS



written and edited by

Gary Nabhan, Cynthia Anson &
Mahina Drees
Meals for Millions/Freedom from
Hunger Foundation/Southwest Program
715 N. Park Avenue
Tucson, Arizona 85719

with introduction by

Danny Lopez, Bi-lingual Cultural
Coordinator
Papago Tribal Education Program

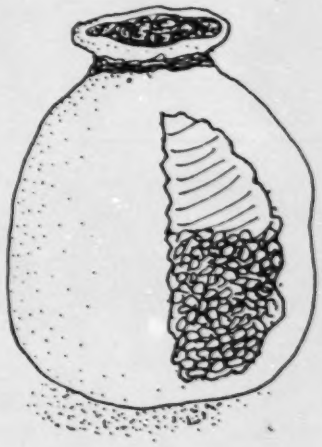
in cooperation with

Papago Nutrition Improvement Program

KAICKA

'ali: Ñ-ba:b, k hascu hab 'e-'a'aga kaicka?

ba:b: Kaicka 'o wud ha:l kai 'o g miloñ kai 'o ps cem hascu kai mo g O'odham gn hu wi'a mat 'ep 'o 'ei ba'ic 'ahid. Hekĭ hu 'as wud si ha-himdag g O'odham mat 'an 'o ha'i wi'a g nanko ha'icu 'e-bahijida kai mat 'ep 'o 'e-'ei ba'ic 'ahid.



'ali: K has masma 'an wi'a g kaicka g O'odham?

ba:b: Kus hab hia masma 'an wi'a g kaicka mat 'am 'al cem bid ha'a c-'ed 'o tua k 'am 'o si bids. Kuts 'am 'o hema bei g ha'a haiñig k 'am 'o 'i hiwsa 'am hugkam mo he'es 'i ciñ g ha'a k 'am hekaj 'o ku:. K 'amjid g segai 'usabĭdag 'an hekaj 'o si bids.

'alı: K hascu 'a:gi 'am si kukpa hegai ha'a?

ba:b: Kus heg hekaj hab wua mat ha'ap hab pi 'o hu: g kaicka g nanhagio 'o g 'u'uwhig. Ts gn hu hasko s-'ap 'o dai g ha'a kut 'am 'o 'i 'e-'ai mat 'ep 'o 'e-'e'esa t 'am hahawa 'ep 'o 'ui g kaicka k 'ep 'o 'ei.

i

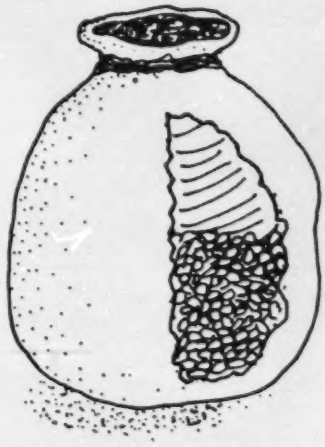
SEEDS FOR PLANTING

Child: What is called kaicka?

Grandfather: It is the storing of seeds. It can be the seeds of squash or of melons or any kind of seeds. These seeds are stored so that they can be planted next year. It was the custom of the people of long ago to store the seeds of their crops so they could plant these seeds again.

Child: How did the people store the seeds, Grandfather?

Grandfather: The seeds were placed in small clay ollas which were closed with broken pottery and sealed with greasewood (creosote) sap. The broken piece of pottery that was used for a lid was ground down to the size of the olla's mouth. Then the greasewood sap was heated, and when it became soft it was used as a glue to seal the lid.



Child: Why did the people have to close the little ollas?

Grandfather: The little ollas were closed because the people did not want the packrats, mice, birds,and other animals to get into the seeds and eat them up. The lids also kept the water out. The ollas would then be put in a safe place until it was time to plant again.

'ali: K has masma 'e'eṣa g O'odham?

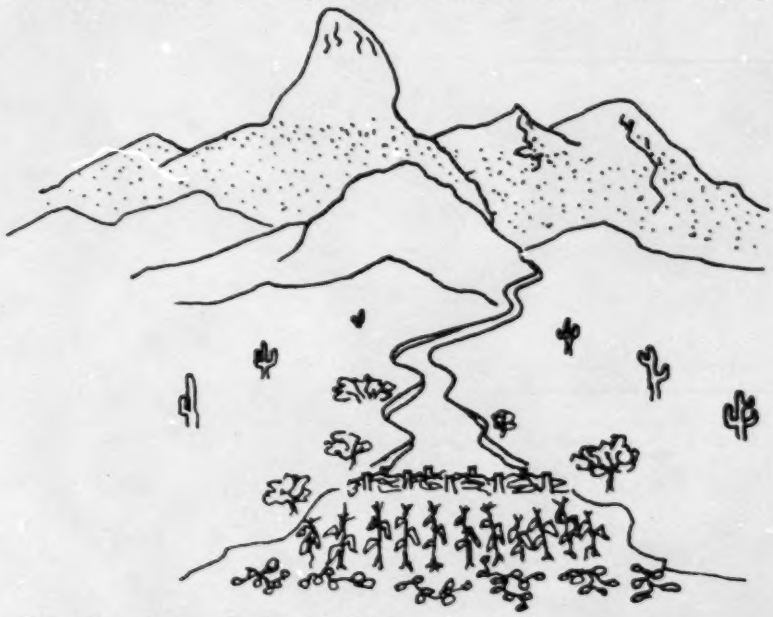
ba:b: Hekĭ hu 'o g O'odham cem 'e'eṣa 'eḍa mo jujku kc wa'upaḍ g jeweḍ. Mat 'am o 'i 'ei g O'odham k 'am 'o ñi'okĭcul 'o 'am 'o ñe'ic g kaij k 'am hahawa 'o 'ei. Hab wuḍ 'a:ga 'i:da mo 'am ho'igedahuñ c 'am 'i gewkemhun g ha'icu 'e-'eṣa. Hekĭ hu 'aṣ g hemajkam 'aṣ g 'u:skaj 'e'eṣa. Kuṣ g 'e-we:m ki:kam hehe'ejel 'o'oidag c 'am 'e'eṣa.

'ali: K hebai hab cem 'o'oidag g hemajkam?

ba:b: Gan 'o hu cem 'o'oidag g hemajkam mo g ṣu:dagĭ 'an 'aṣ komal memḍa. I:na mo 'an 'e'eṣa g hemajkam 'o hab 'a'aga 'o'oidag. In 'o 'e'eṣa kc 'an babbaijid c gn hu s-'ap tu'aw g ha'icu 'e-bahijida. Hekĭ hu O'odham 'o we:s ha'icu 'am 'i 'a'amicud. We:s ha'icu maṣ 'am hab junhim 'idam hemajkam 'aṣ 'am 'a ha'icu wehejid hab wua. Ha'icu 'aṣ s-'a'amicud c 'ep s-wapagima g 'o'odham. S-'ap 'as 'in ki:dag kc s-'ap 'ab 'a'ai 'e-ñeid c si has 'elid g jeweḍ c we:s haicu duakam. Pegi na'a, ñ-ba'amaḍ meḍk ha-we:m cicwi g 'a'al. Pi g 'o 'e-ceggiad c ṣaba pṣ s-'ap 'o 'e-we:m cicwid.

Child: How did the people of long ago plant?

Grandfather: The people planted in the month of the big rains when the ground became moist. Before the person started putting the seeds into the ground, he would talk or sing to the seeds. This was a way of praying and encouraging the plants to be plentiful so the people could eat. In the old days, they used a digging stick to dig holes for the seeds. Each family had their own field where they planted.



Child: Where did they have their fields?

Grandfather: The fields were located at the mouth of the wash or where the rain water runs onto the flat part of the earth. The place where the people planted was called the fields. This was where the O'odham planted, harvested, and stored their foods for the months ahead. The long ago people had things all planned out. They did things for a reason. They were very smart and they worked hard. They lived in balance and harmony with themselves and with the earth and nature. My grandchildren, go play now with the other children and do not fight but play together.

SAVING WHAT OUR ANCESTORS GAVE US

One July, not too long ago, an elderly Papago farmer was working in his field near a desert wash below the Baboquivari Mountains. He plowed the earth still moist after the first summer rain. He then went over to his 'ispiñ (storage shed) to see what seeds he had to plant. There in the shed were a few small sacks of the seeds given to him by his father and grandfather, seeds of the old foods of the O'odham--s-moik hu:ñ (60-day corn), s-tota bawĭ (white tepary beans), and others. There were also some packages of seeds from a store in town and beans left by the government commodity foods program.

He decided to try planting a little of each kind, both the O'odham kaicka (Papago seeds) and the store seeds. They all came up okay, and over the next few weeks he watched them grow. But hardly any rains came. The desert stayed hot. The plants from the government and store-bought seeds grew big leaves and began to flower, but then they wilted and dried up. They never produced anything. Then there were the plants from the seeds his forefathers had saved. They had smaller leaves and at first did not look like much. But they grew fast and produced a good crop, in spite of the drought.

The old man was thankful for this. Instead of eating all the beans and corn he grew, he saved some of each for planting the next year.

But what will happen to these O'odham kaicka when the old man passes on? Will they be buried with him, like some of the last Indian tobacco seeds on the Gila River Reservation? Will they be forgotten and left for the kokson (packrats) and waptopi (worms) to spoil? Or will his sons and grandchildren have a chance to plant and grow their own foods as the O'odham have done since the beginning.

The traditional O'odham crops are often able to grow in the desert heat and drought with less water. Sometimes they can withstand certain diseases and insects that other plants cannot. Studies have found that many foods grown by desert Indians are more nutritious than store-bought foods. They are often richer in vitamins, minerals, and protein. Growing your own food means that you spend less money at the store and less for gasoline to get there. Since oidag cikpan (farm work) is part of the O'odham himdag (Papago/Pima way), keeping your fields full of crops means working to keep the traditions of the Pima and Papago alive, too.

But unless the knowledge and skills for keeping the traditional seeds alive is passed on, the seeds may just dry up--gaksap. And once a seed is gone, it is gone forever.

This is why the National Association for Gardening urges us all to keep growing the seeds of our fathers and forefathers: "If your inheritance includes old varieties of seeds, care for them well. Share them with old friends and neighbors. Ask every elderly gardener you know if there are old varieties in his or her garden. Plant and preserve them--for tomorrow."

SEED STORAGE PROBLEMS

Anyone who tries to save seeds has a number of challenges to face:

1. Harvesting the crop before the birds and rabbits do.
2. Getting the seeds dry enough that they do not mold and spoil.
3. Threshing the seeds so that they are clean.
4. Selecting and sorting out the best seeds to save for growing.
5. Finding a place cool and dry enough to store the seeds.
6. Storing the seeds where pests cannot reach them.
7. Planting the seeds before they dry out and die.

Over centuries, Indian farmers learned ways to overcome these problems. They learned to treat each kind of seed in a different way so that each kind would grow well when planted. More recently, scientists have studied the conditions under which seeds stay alive for the longest time. Their studies confirm that many of the O'odham ways of saving seed are effective.

Let us look at the old ways of saving seeds first, then at additional 'modern' methods you can use at home with materials you already have on hand.

TRADITIONAL SEED SAVING PRACTICES

Old time Papago and Pima farmers took a lot of care with kaicka--the seeds they kept for planting. With all the kai, such as peas, beans, wheat, barley, lentils, garbanzos, and corn, people decided at the time of harvest how much of the seed would be saved to plant again and how much would be stored to eat during the year. Part of being a good farmer was to make sure you saved enough seeds to be able to plant your 'oidag (field) or garden again the next year.

With these plants, the whole crop is gathered at one time. After the seeds had ripened and dried on the plants, the whole plant was pulled up and the seeds taken off. For corn, the ears were picked off and keliw (shucked). The stalks of grains and beans had to be mohonakud (threshed). Horses or mules were used to help thresh the wheat on special,threshing floor circles. All these seeds were giki (winnowed) and dried for a few more days on mats in the sun. It usually took a lot of people working together to bring in the harvest.

It was right then that people decided which seeds would be saved for kaicka and which would be stored for hegi (food). They always looked for the s-kegaj kai--the good looking seeds--the ones that were big, hard, and nicely shaped with no bruises or unusual color. They did not save any kai that were wrinkled, broken, or misshapen. Different colors of seeds--like white and brown bawĭ--were separated from one another and kept separate.

For melons and squash, the fruits were harvested one by one as they ripened. People took care to cut the stem about six inches above the fruit, rather than right at the fruit, so the squash or melon would not be damaged and spoil. The squash and melons could be stored inside. They could also be stored outside under a 'teepee' of corn and cane stalks where they would

ripen some more. The fruits could be kept a long time--even watermelons were sometimes good until mid-winter.

When a squash or melon was eaten, the women who prepared it for a family meal were careful to save the kaicka inside. They did not save seed from all the fruits, though, only the largest, sweetest ones with the hardest skins. A woman would take out the whole mass of seeds and stringy material and let it dry in the sun before storing the seeds. Some people say it was important to leave the pulp or stringy fibers around the seeds, for that would help the next year's fruit be sweet.

'i'hug (devil's claw) and wapko (gourd) seeds could be taken out of the fruit almost any time. The main thing was to choose seeds from the longest devil's claws and from the gourds with the right shape for making dippers or rattles.

O'odham farmers preferred not to plant seed that was more than a year old. People knew that the seeds became weaker as they got older, until they dried up and were no good for planting. The old-timers believed "you should plant fresh seeds each year because they won't last forever." They also knew that to keep the seeds alive and strong until the next year's planting, they had to be kept dry and protected from pests. The Ge Hemajkam (Old People) had their own special ways of protecting the kaicka.

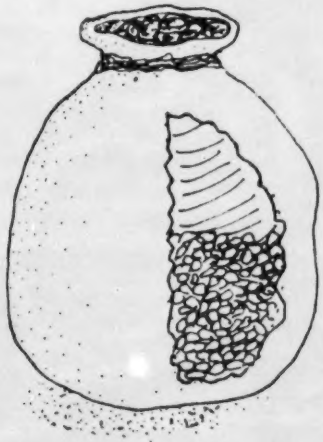
In the old days, nearly all the kaicka were stored in hahawa (clay pottery jars with narrow mouths). A piece of broken pottery was trimmed down and

shaped to make a lid to fit in the mouth. After the lid was put on, its rim was covered with ṣegai 'uṣabĭdag (creosote bush gum) that was heated until it was nearly liquid and then used like glue to seal the lid tight. Sometimes clay mixed with salt was put on top of the lid instead. These covers prevented any water or pests from getting into the seeds.

Sometimes kaicka were stored in baskets instead of pots. One kind of basket--waṣomĭ--was very large, big enough to sit in. The waṣomĭ could be made of beargrass, arrowhead, or wheat straw. These baskets would expand and bulge as you filled the basket with seed. Air would blow through the cracks and keep the seed dry. This kind of basket was often put on the roof or on raised platforms, benches, or 'cribs.' Different layers of seeds were separated by mats.

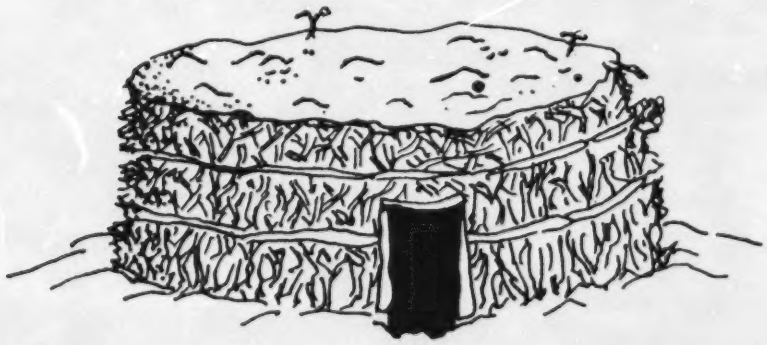
In these containers the kaicka were both dry and safe from pests. They were well protected against the kokson (packrats) and nanhagio (mice). Even the kui kai mamaḍ (tiny bugs) and waptopi (worms) could not get in.

Later on, after the trading posts began to sell things, the O'odham began to make use of cotton bags, too. Tobacco pouches and sugar, salt, and coffee bags were saved. Seeds were put in them and the bags were hung from the rafters by their drawstrings. The farmers used to hang wapko (bottle gourds) full of seeds from the rafters, too.



A long time ago, the people stored their jars and baskets in the dark, cool ce:ho (caves) up on the sides of the mountains. They would put the hahawa in there, pile up rocks in the cave mouth, and return for them when food or seeds were needed. "That is why we find the hahawa in the ce:ho now," said an elder from Ge Oidag. "They are the ones the Old People left."

Later the kaicka and the hegi were stored in the 'olas ki: (round brush house). Each family had their own 'olas ki:. It was made of melhog (ocotillo), mud, and posts. Dirt and branches and grass were piled on the roof to keep it cool and dry inside. A lady from Kaw'lik says it was so cool inside, even in summer, that jello would harden up in there. Inside there were benches and shelves,like a small wa:tto, and the containers of kaicka and hegi could be set on these. The 'olas ki: was kept closed except "when they needed to get something, they would go in and get it, then close it back up," as one man said. Perhaps a few people continued to hide some seed away in the ce:hoas a kind of insurance. If anything happened to the 'olas ki:, then they would still have some kaicka.



As things changed, people stopped building the 'olas ki:. Instead the seed storage house was built more like a wa:tto (ramada). It was moved closer to the house. People even began to call it by a different name--'ispiñ or "where you store the food." Today the O'odham store seeds in all kinds of containers such as lard cans, coffee cans, plastic bowls, and gunny sacks. The ispiñ may be just a closet or pantry inside the house.

In the old days, even with all the precautions that the Old People used to take, sometimes things went wrong. "Sometimes the seeds got wet or the bugs got in. Then you would have to throw the whole thing away." Or, "if the crops dried up, and you got hungry; then you would have to eat the kaicka. Then you would not have enough to plant the next year," an elderly person remembered.

If people lost their seed, they could go to someone else and get kaicka from them to use for planting. People could turn to their relatives and neighbors. They even exchanged that way with other groups. The Akimel O'odham (Pima) would give the Tohono O'odham (Papago) wheat seed to start again, and the Papago, in return, would give other seed of their own or from Mexico.

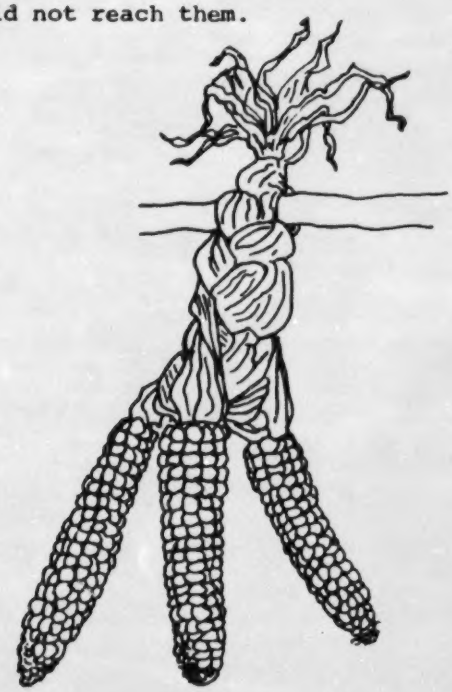
Talking about people who were generous with their extra seed, one woman said, "They always shared. Our people are like that--they always shared. If someone did not have some seed, they exchanged it for something else. That's the way they were."

SELECTING SEEDS FROM THE BEST PLANTS YOU CAN FIND

Crops can get better or worse over the years, depending on how much work and care you give them. You can gradually make your plants stronger by selecting the best seeds from each harvest and growing these seeds the next year.

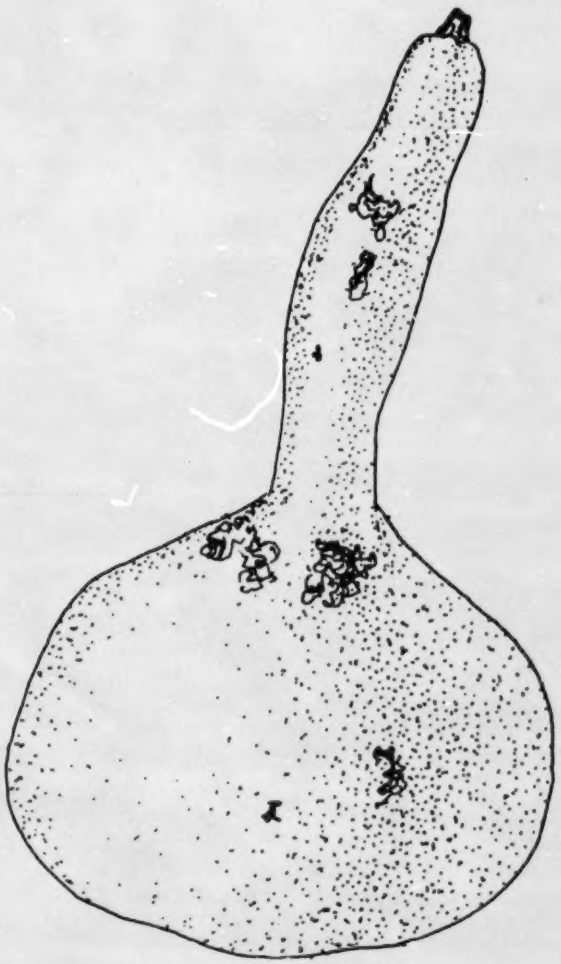
The O'odham women have done this with 'i'hug, the devil's claw that they weave into their baskets. A Papago basketmaker in Santa Rosa says, "I only plant the seeds from the longest ones. Over the years, the ones coming up in my garden keep getting longer and longer." Some white-seeded devil's claws are so long and dark that they no longer even look like the wild devil's claw plants that grow out in the desert.

The Ge Hemajkam in the old days looked for the ears of corn with the largest, plumpest, most evenly-colored hu:ñ kai (kernels) and would take special care of them, braiding their husks together and hanging them from rafters where animals could not reach them.



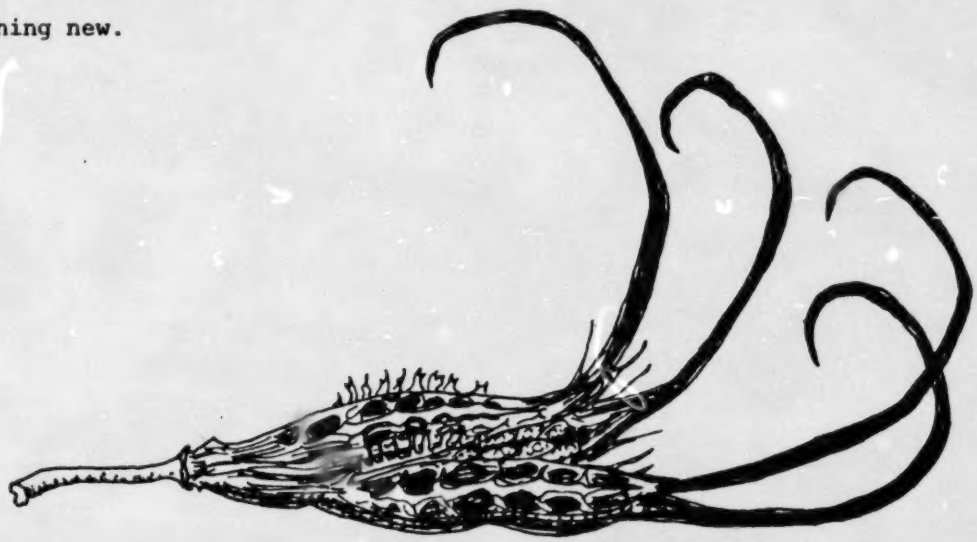
The same can be done for other kinds of crops, ha'icu 'e'es. If you try over a number of years, you may be able to:

* develop a hotter or sweeter tasting chile...
* grow corn that produces even in the hottest, driest years...
* keep ha:l and keli ba:so (squash) with hard skins that stay good and sweet even when stored through December...
* select wapko (gourds) just the right shape for dippers...



Anyone can do this kind of selecting and saving. Remember these four secrets:

1. LOOK AT EACH PLANT AS A WHOLE with all of its fruits, rather than just taking seeds from the first big fruit you notice. What if that big fruit is the only good one on a vine that is filled with bad ones? Chances are the seeds will produce bad ones, too. It is better to choose seeds from plants that make good fruits all season long. Watch for plants that do well even in the heat and that do not get diseased or covered with bugs. If all of a plant's fruits are unusual, like four-clawed 'i'hug, save its seeds--you may start something new.

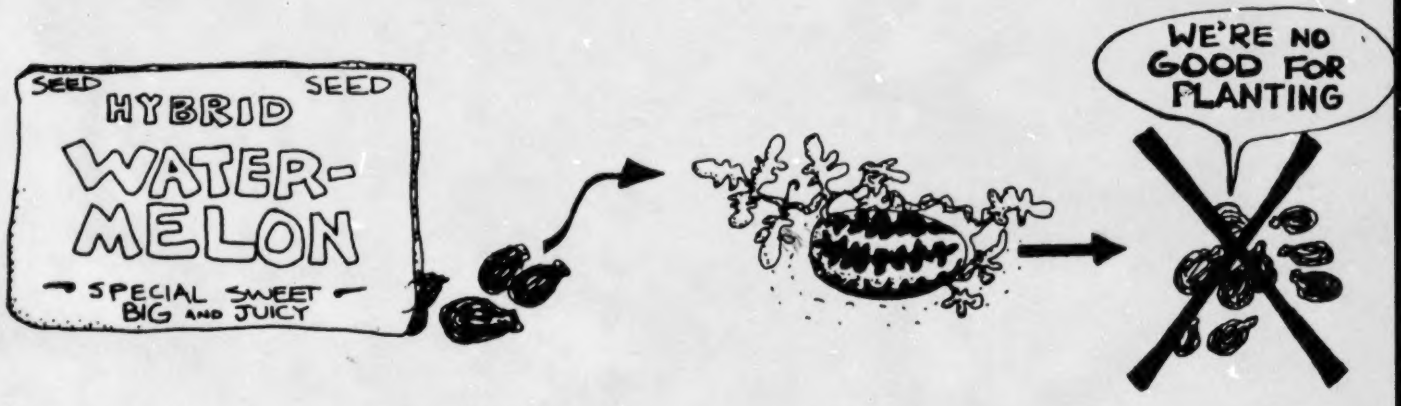


2. WATCH FOR GOOD QUALITIES OF THE FRUIT EVEN AFTER YOU HARVEST. Remember to save seeds from the ones that store longer, taste sweeter, or are best for grinding and cooking. But do not grind and cook them all, no matter how good they taste.

3. SORT OUT THE GOOD LOOKING SEEDS FROM THE PLANTS YOU HAVE CHOSEN. Save the full sized seeds, not the ones that are thin, shrivelled, damaged by pests, or moldy. Throw out the broken or hollow ones. For squash and melons, do not remove the seeds immediately after the harvest but wait two to four weeks for the seeds to ripen.

4. NEVER TAKE ALL YOUR SEEDS FROM JUST ONE PLANT. A mixture from several plants is better. If all your seeds for planting come from a plant that has no resistance to disease, and a disease comes into your garden the next year, all your plants from those seeds will die. Instead, if you plant seeds from several plants, there is a better chance that at least a few will have some disease resistance. Planting a mixture of seeds gives you insurance.

These ways of saving and improving seeds will only work for the old or non-hybrid crops. Seed packages in stores that are marked HYBRID SEED or F_1 HYBRID have been specially produced by the seed company so that you must buy new seed from them every year. What happens if you try to save the seed from hybrid vegetables that came from seed you bought? If you plant them, some won't even come up. Others will sprout, but they may not look at all like the vegetables from the year before, nor will they taste the same. If you want to buy some kind of vegetable seed and save its seed from year to year, make sure the package does not say hybrid.



Sometimes, accidental hybrids are made in your gardens. For instance, you may grow two kinds of chiles--a long red one and a smaller, hotter jalapeño chile. If they are planted next to each other, a bee may go to the flower of the red chile and then to the flower of the jalapeño. By doing this, it may accidentally "mate" them. If you save their seeds, the next year you may have chile bushes that produce hot red chiles or funny-shaped jalapeños! This can happen to other kinds of plants, too--ones that are called cross-pollinating, such as corn, squashes, or melons. This means that if you grow O'odham white

corn next to Hopi blue corn, the ears will have seeds of both colors on them. Some people like these mixed-up, multi-colored corns; but, if you want to keep O'odham corn for roasting and grinding into gaiwsa, do not plant it next to sweet corn or blue corn, or the seeds won't have the same texture. Being cross-pollinated does not mean that melons will cross with squashes, or that corn will cross with cane sorghum. You can plant these kinds of crops next to each other without getting accidental hybrids.

CLEANING, THRESHING AND DRYING SEEDS

CORN

Harvesting

Corn is ready to pick when the stalks and husks are completely dry. Either the whole plant can be pulled up, the plants stacked, and the ears removed later; or the ears can be picked off the standing plants, and the cattle can be let into the field to eat the stalks. After you have picked off the ears, put them in piles, keeping corn of different colors separate.

Choosing seed corn

Now is the time to pick out the ears you will use for seed corn. Follow the directions in the seed selection part of this book (pp. 9-14).

Drying

The ears should be dried in a sunny place for about ten days. A good place to dry them is on the roof. It does not matter if the corn gets rained on, as long as it dries out again. The corn must be completely dry before you store it.

Shelling

Once the corn is dry, you can store the ears with the husk still on. But most people husk and shell it first, and this is the way the Old People did it. There are at least three different ways to shell corn:

1. Remove a few grains from the tip of the ear, then twist or brush the rest off using a shelled corn cob.
2. Remove one or two rows of kernels with a sharp instrument, then twist the cob in your hands.
3. Use a mechanical sheller.

After the corn is shelled, pile the kernels on a clean cloth and let them dry in the sun a few more days. The corn is now ready to be stored.

BEANS AND PEAS

Harvesting

When most of the pods are dry on the plants, pull up the plants, roots and all. Place the plants upside down in piles and let them dry in the sun for about a week. In the old days, the plants were stacked on the threshing floor in the field. Be careful to keep the different kinds of beans and peas separate from each other. Even white and brown teparies should be stacked separately.

Threshing

When the plants are good and dry, take a stick five or six feet long (an old mop or broom handle is excellent) and beat each pile of plants to separate the pods from the vines. You can also use a flail (see next page for how to make a flail) or even a long springy branch. Do not be too rough on the beans and peas. They can be bruised or damaged easily--then they will not sprout when they are planted. After the first threshing, spread a clean cloth (an old sheet is good) on the ground. Gather all the pods of one kind of bean and pile them on the sheet. With a shorter stick, one about two feet long, beat the pods until the beans fall out.

(continued on page 18)

How to make a flail

A flail is a long wooden handle with a short stick called a swingle wired to one end. You can use an old mop handle or broomstick for the long piece. The swingle must be of hardwood; mesquite would be good. The two pieces must be fastened together securely, but so that they move.

"The Bean Bag" - This is a clever way to thresh beans that John Withee, a bean grower, uses. Make a strong, funnel-like bag out of an old gunny sack, flour sack, pillowcase, or other material. The bag should be about five feet long and three feet wide at the top of the bag. Tie the bottom of the bag closed and fill the bag with dried bean plants. Hang the bigger end of the funnel bag from a branch. Then beat the bag with two sticks until the beans fall to the bottom of the bag. Put a container under the bag, open the bottom, and shake out the beans.

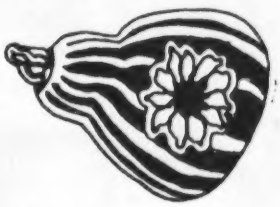
Cleaning

Put another clean cloth down on the ground. Take a large shallow basket and fill it with beans. Hold the basket up at shoulder level and slowly shake out the beans. The wind will blow the pods and stems away, and the beans will fall to the ground. Repeat until clean.

Drying

The beans still need to be dried in the sun for several days before they can be stored. Just put them on a cloth, a mat, or a screen in a sunny spot.

You can feed the leftover pods and vines to the horses or cows, or you can dig them back into the soil to make it richer and softer next year.



SQUASH, MELONS AND GOURDS

As you eat these fruits, save the seeds of the ones that keep longest and are the largest and sweetest tasting.

Cleaning

Carefully cut open the squash or melon. Gently remove the seeds and stringy material around them with a spoon or your fingers. Put it all in a bowl of water and work the seeds free with your fingers.

Drying

When the seeds are clean, spread them on a screen, wax paper, newspaper, or tin foil. Put them in a sunny spot to dry for a week. Every day move the seeds around a little so they will not stick together.

Here is one idea for drying squash seed from a Pima man. He says that with melon or squash, his wife, "used to put the seeds and stuff in a sock and put it up on the clothesline, then check and stir them around and let the wind dry them. When it got dry enough to crack that stringy pulp around the seed, she would know it was dry. Then she would take them out of the sock and crumble the pulp off and put the seeds in a jar. She would store them from season to season."

Watermelon

The best way to save watermelon seeds is to have a family feast. Everyone should eat as much watermelon as they can and put the seeds in a bowl. Then wash the seeds and let them dry in the sun for several days until the seeds break instead of bending. Then they are ready to store.

WHEAT AND OTHER SMALL GRAINS

Harvesting

You can pull the wheat plants out by the roots, or you can cut them off just above the ground with an o:so (sickle). Move the plants to the threshing floor and stack them in piles. Let the stacks of wheat dry for several days.

How to make a Threshing Floor

In the old days, threshing floors were made in or near a field and repaired each year at harvest time. To make one, pick a spot near

your field or yard that does not flood when it rains. Build a low circular dike out of dirt. Moisten the surface of the ground inside the dike and tamp it down by foot or with a heavy object. If you plan to use horses to do the threshing, make the threshing floor at least thirty-five feet across and put up a tall, strong pole in the middle.

Threshing

Here are three ways wheat was threshed in the old days:

1. Trample the piles of wheat by walking on them or beat them with ocotillo poles.
2. Tie several horses abreast with the inside horse roped to the pole in the middle of the threshing floor. Drive the horses in a circle over the wheat until the seeds are separated from the stalks and seed coverings. One person will be needed to drive the horses and another to rake the grain.
3. Put up two forked posts and put a mesquite post across them. Beat the wheat stalks against the wheat bar.

Here is a new way to thresh wheat:

Lay a cloth down on the ground. Put the wheat on it and put another cloth on top. Drive a car back and forth across the wheat until it is threshed.

Cleaning

On a slightly windy day, toss the wheat into the air with a pitchfork to remove the biggest pieces of straw. Then gather up the wheat and chaff that is left and put it in a large basket. Hold the basket up at shoulder level and shake out the contents over a a clean cloth. The grain will fall to the ground and the chaff will be carried away by the wind.

Drying

Let the grain dry on cloths for two or three days. When it is very dry, it is ready to be stored.

CHILES

Always save seed from pods that have turned ripe and red on the plant. Spread these pods on a cotton cloth to dry in the sun for four or five days. Either cut open the pods and remove the seeds for storage, or you can store the whole pods and break them open only at planting time.

STORING SEEDS AT HOME

Since few O'odham families still make hahawa (pottery jars) to put things in, other kinds of containers must be used for seed storage today. Yet, the same principles hold true for storing seeds now as they did for the huhugam (Hohokam) and others who went before us:

1. Kaicka should be kept separate from seeds (corn, wheat, etc.) for food, so that they won't accidentally be eaten.
2. Seeds must be very dry before you store them, or they will spoil and get moldy with mamaḍhod.
3. Seeds are best kept in a clean dry container with a tight lid in order to keep out rain, insects, and other pests.
4. Each kind of seed should be kept separately so that they don't get mixed up. Also, this will prevent kai mamaḍ (insects) from spreading from one kind of seed to another. Mark the kind of seed and the year it was grown on each container.
5. If the seeds already have worms, insects or eggs in them, they can be killed by freezing them for a day. Only do this if the seeds are completely dry. If the seeds are just for planting, not for eating, you can mix five spoonfuls of motor oil in with a pound of beans or corn in order to coat each seed. This will kill most insects.
6. Putting matai (ash), 'oñ (salt), sand, and other materials in with the seeds may help discourage pests and absorb any extra moisture.
7. Containers are best kept in a cool, dry, shady place where the temperature doesn't change too much.

Let's see what things can be found around the villages that can be used to keep seeds in good condition:

CONTAINERS: Clean glass jars with metal tops are best--just wash out old jelly and peanut butter jars. Coffee cans or other metal cans with plastic lids are okay. Containers that are all plastic are not good because they let moisture in, and then it can't get back out again. Whatever you use, make sure it has a lid. If the lid doesn't snap or screw on tightly, seal it with black electrical tape.

Wash each container thoroughly with soap and water. Let it dry out completely before putting the seeds inside. Do not use any moldy jars.

If you have just a little of different kinds of seeds (like chile seeds), put each kind in a small envelope and write its name and the year it was last grown on it before sealing these envelopes in the jar. For batches of seed that are too big to keep in a jar, put them in cloth bags and tie them closed. Hang the bags from the rafters where rats and mice can't get into them and where the smoke from the cooking or heating fire will drive off insects.

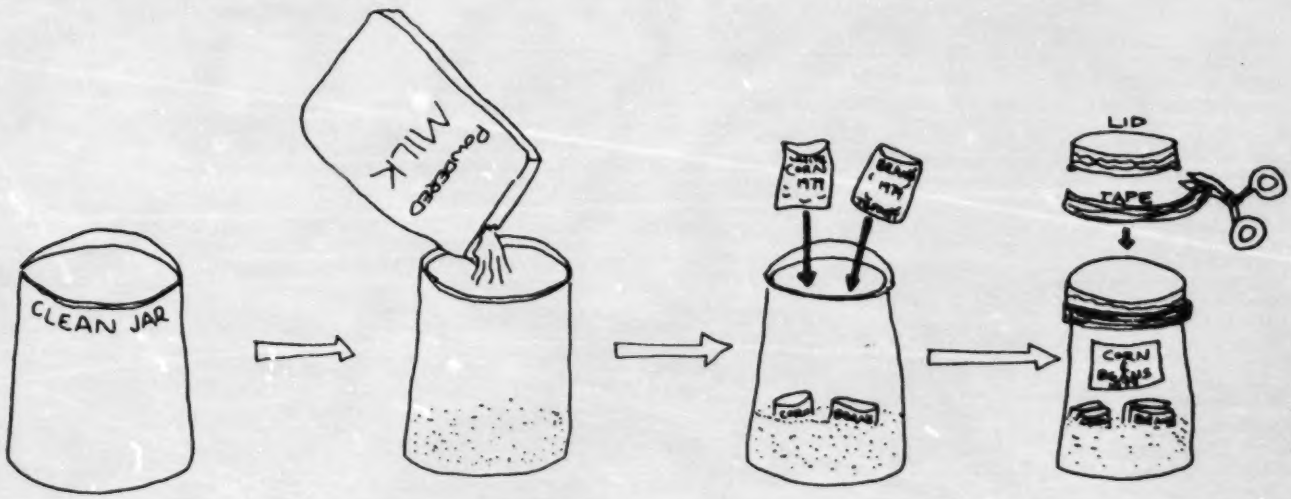
LABELS: Write the kind of seed and the year it was grown on a small piece of paper and put that in with the seed. Do the same on another piece of paper and glue or tape it to the outside of the container. That way you don't have to keep opening the jar to know what is inside of it.

KEEPING IT DRY INSIDE: It is good to put something into the container that will absorb any dampness or moisture that may leak in and spoil the seeds. Either corn starch or commodity powdered milk can be put into the jar to collect this extra wetness so that the seeds won't get soggy. Make a small cloth bag of dry milk or corn starch about half as big as the bunch of seeds you are storing. If you ever feel the powder getting damp, replace it with more dry

starch or milk. In any case, change the powder once a year. When you put the milk in, close the jar and let it sit at room temperature for a few days before putting it in a colder place.

KEEPING THE BUGS AND WORMS DEAD: Sometimes insects lay eggs in seeds while they are still on the plants in the field. (You might not notice them until later on, when it may be too late.) Some seeds like galwas (garbanzos) and 'u'us bawi (black eyed peas) are easy for kai mamad to spoil, while other ones like the s-toa bawi (white tepary beans) are too hard. Always throw out the seeds that you see the kai mamad have made holes in, or else they will spoil the other seeds, too.

The best thing you can do to prevent pest damage is to dry the seeds in the sun. Then put them in a freezer for a day to kill the insects that remain alive but hidden. If you can store them in a place where the temperature stays below 50°F, new eggs of insects won't be able to hatch. If you find live animals in them again, just put them in the freezer for another day. For long term storage,put moth balls, matai (ash), or wi:w (tobacco) in with the seeds. The pests don't like these and will try to get away from them.



THE BEST PLACES TO KEEP THE CONTAINERS: Many O'odham families still have an 'ispiñ, a pantry or shed for storing foods and seeds. As long as they stay dry and cool, these are good places for keeping the kaicka. Hide the jars or bags away from windows so that they are shaded in the summer. Keep them on top of shelves, crates, or benches off the ground, or hang them in bags from the beams or rafters.

For families that have refrigerators or freezers, these are the best places to store seeds. Even for plants like chiles that can't stand the cold, it is okay to freeze their seed. Seeds will last much longer under frozen conditions--they"breathe" more slowly and so don't burn up all their stored food. Just make sure the jars do not get icy inside. Seal them tight. When you take a jar out from the freezer or refrigerator to get some seeds out of it, dry it off and seal it again before putting it back in cold storage.

HOW LONG CAN SEEDS BE KEPT AND STILL BE GOOD FOR PLANTING?

CROP	1-3 Years	4-6 Years	7-9 Years
Corn	Good to fair	Fair to poor	Poor
Tepary Beans	Good	Poor unless treated (see below)	Poor unless treated (see below)
Other beans	Good	Fair	Poor unless treated
Squashes	Good	Fair	Fair
Melons	Good	Fair	Fair to poor
Watermelons	Good	Fair	Fair to poor
Chiles	Fair	Poor	Poor
Devil's Claw	Good	Fair	Fair
Cane Sorghum	Good	Good to fair	Fair
Wheat	Good	Good	Fair
Peas	Good	Good to fair	Fair
Garbanzos	Good	Fair	Poor

This chart shows the ability of seeds to sprout after being stored at room temperatures. Good means that out of 100 seeds, 70-100 will probably sprout. Fair means that out of 100 seeds, 35-69 will probably sprout. Poor means that less than 35 will sprout and that there is the danger of losing that kind of seed altogether. This information is good only if the seeds are kept dry, and if they are protected from kai mamaḍ (pests).

For teparies,and sometimes for other beans, old seeds get so hard that they won't sprout unless treated in special ways. If you have just a few seeds that you want to plant, scratch or nick the seed coats with a knife or razorblade to let the water in. If you have a lot to do, there is an easier way to treat them, but it takes a few weeks of letting them sit under special conditions. To"recondition" them, put damp, moist sawdust in a bucket, and put a screen on top of the sawdust. Then put the hard beans on the screen and cover the bucket. Keep them on top of the sawdust for two to four weeks. This will soften them so that they will be able to sprout. Do a germination test to make sure they are ready.

GERMINATION TESTS: CHECKING TO SEE IF SEEDS WILL SPROUT

The only way to know for sure that a bunch of seeds will be good for planting is to try to sprout a few before planting time comes. A germination test is simply keeping a few seeds damp indoors and then comparing the ones that sprout to the number that do not. It can be done in less than two weeks for most kinds of seeds. This test can help you decide which seeds and how many of each kind should be planted.

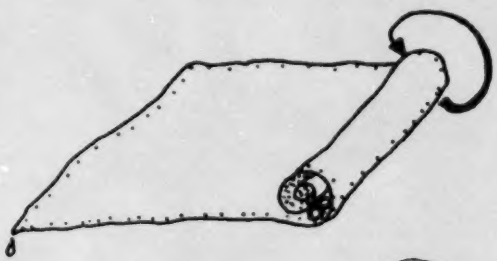
There are two ways to do a germination test. For both ways, you need only a few seeds--20-25 seeds of corn, beans, or squash and 50 seeds of wheat or sorghum. Take this many out of the jar or bag and seal it up again. Then do one of the following two tests.

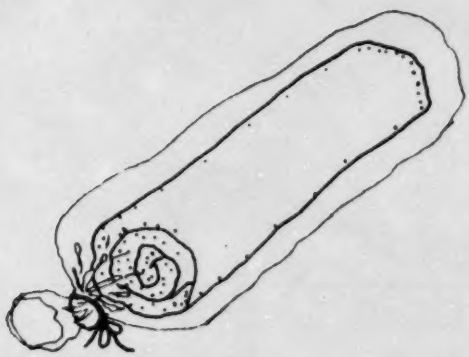
The "Cigar" Germination test

This way is called "Cigar" because paper towels are rolled up so that some people think they look like cigars. Here's what you do:

1. Take a paper towel and soak it in water. Then squeeze out most of the water and smooth the wet towel out flat on a table or counter.
2. Count out 10 seeds and put them on the towel in a line about two inches from the end of one of the wide sides. Then fold the towel over the seeds and roll it up.
3. Carefully put the rolled-up,wet towel full of seeds in a plastic bag. Tape a piece of paper with the date written on it to the bag. Tie the bag shut. Place it near a sunny window or on a table nearby. The seeds need to be warm, but not over 90^{o}F.
4. Do this for 5 towels if you are testing 50 seeds, or less if you don't have that many seeds to begin with.
5. Open up the bag every day or two and check to see if any seeds have

Some people do germination tests on a little bit of their seed every year to make sure that it is still good. Be sure to do a test if you are thinking about planting old seed (4 years old, or older). In this way, you can save yourself the work of plowing and planting a big place for seed that may not be good anymore.





(continued from page 27)

sprouted. Sprinkle the towel with water each time, if it seems to be drying out, so that it is always wet. If mamaḍhoḍ (mold) starts growing, rinse the seeds, put them in another wet towel, and keep the bag open.

6. After 10 days, count the number of seeds that have sprouted. If less than ½ of all of them have sprouted, you will not want to plant these out in a field. Instead, plant the seeds close together in a garden next to your house or someplace where you can give them extra care, protection, and water. If none sprout, you know that the seeds are probably not good for planting. Try to find a relative or friend who will give you some of this kind of seed.

The "Lid Bath" Germination Test

This way is called a lid bath because you take the metal lid of a ma'ispadag, ma'ispakud, (glass jar), turn it upside down, and put water and seeds in it. Here is what you do:

1. Find 5-10 lids of wide-mouthed jars, wash them in hot, soapy water, rinse them, and turn them over. Cut out circles of paper towels to fit in the bottom of each lid.
2. Set 4 or 5 seeds in each lid. Pour a little water in on top of them so that it comes up about half way on each seed.
3. Set the lids in a plastic bag (like a bread bag) in a warm, sunny place and tie it shut.
4. Check every day to make sure that the seeds don't dry out, and add a little more water if needed. The other steps are the same as the cigar test, once the seeds begin to swell and sprout.

NAMES FOR PAPAGO-PIMA CROPS

Milga:n	O'odham	Ju:kam	Scientific Name
Corn	hu:ñ	maiz	Zea mays
60-day corn	'a'al hu:ñ	onaveño	
	s-moik hu:ñ		
flour corn	ṣodon hu:ñ	maiz blando	
June corn	s-kawk hu:ñ		
	ṣedai hu:ñ		
popcorn	hiosigam hu:ñ	reventador	
blister corn	s-wapsuḍ hu:ñ		
Beans	mu:ñ	frijol	Phaseolus vulgaris
red beans	wepegĭ mu:ñ		
	ge'egeḍ mu:n		
pinto beans	s-'o'oi mu:ñ	garapatas	
	mamṣ mu:ñ	pinto	
	pi:ndo mu:ñ		
Tepary Beans	bawĭ	tepari	Phaseolus acutifolius
white	s-toa bawĭ	blanco	
yellow	s-'oam bawĭ	amarillo	
red-brown	wegĭ bawĭ	rojo	
Lima Beans	hawol	sieva lima	Phaseolus lunatus
Black-eyed Peas	huhuda wu:pkam	yori muni	Vigna unguiculata
Cow Peas	'u'us bawĭ	ojo de cabra	
	'u'us mu:ñ	ojo de vaca	
Cushaw Squash	ha:l	calabaza de las aguas	Cucurbita mixta
Hubbard Squash	ñepi	calabaza baviri	Cucurbita maxima
Butternut, Big Cheese Pumpkin	ṣaṣkatk	segualca	Cucurbita moschata
Chili Pepper	ko'okol	chile	Capsicum annuum
Wild Chili	'I'itoi ko'okol	chiltepin	var. glabriusculum
	'a'al ko'okol	chile del monte	
Cane Sorghum	ka:ña	caña	Sorghum bicolor
Indian Cotton	toki	algodon	Gossypium hirsutum var. punctatum
Indian tobacco	wi:w	tobaco	Nicotiana rustica
Bottlegourd	wapko	guaje	Lagenaria siceraria

Milga:n	O'odham	Ju:kam	Scientific Name
Watermelon	gepi	sandia	Citrullus lanatus
"chili melon"	ko'okol milon	sandia de chiles	
"rattlesnake melon"	wamaḍkam milon	sandia de viboras	
Devil's Claw	'i'hug (sa'aswadk)	torito, gatuña	Proboscidea parviflora
white-seeded	s-moiḳ	de semilla blanca	var. hohokamiana
Cantaloupe	u:ha:l, milon	milon	Cucumis melo
yellow	s-oam milon	amarillo	
honeydew	keli ba:ṣo		
Wheat	pilkañ	trigo	Triticum aestivum
Sonoran wheat	'o'olas pilkañ	flor de America	
Pima wheat	wepegi pilkañ	trigo de Sonora	
Baart wheat	ciñwokam pilkañ	trigo con barbara	
(long headed)	ce'e cew-mudadkam		
	s-ciñwodag pilkañ		
Barley	siwa:yo	cebada	Hordeum vulgare
Baboquivari Onions	'I'itoi siwol	cebolla del monte	Allium kunthi
Garbanzos, Chick peas	kalwaṣ	garbanzos	Cicer arledinum
Lentils	la:nji	lentejas	Lens esculenta
	lanjeki		
Peas	wihol	chicharro	Pisum sativum
green	cehedagi wihol	verde	
yellow	s-'oam wihol	amarillo	
white	s-tota wihol	blanco	

OFF-RESERVATION SOURCES OF THE OLD KINDS OF SEEDS

For a long time, the Indian people were the only ones who had certain kinds of seeds adapted to the desert. Although you could get other kinds through markets or from seed catalogs over the last fifty years, the old kinds of seeds were seldom sold this way. Brightly colored "Indian corn" from other tribes was the only native crop that you could find in seed catalogs, but it wasn't native to this area. The Desert People had to save their own seeds. If they lost them, they had to try to find more from relatives and neighbors. There was no other way!

But over the last seventy years, some of the Papago and Pima crop seeds have been saved and studied by agricultural scientists working for the government and the universities. In Sacaton years ago, scientists were given some Akimel O'odham toki, the old kind of cotton grown by the O'odham. They saved some and used part of it to breed the Pima Cotton that is now woven into our shirts. Another scientist, Robert Forbes--the first white man to climb to the top of Waw Kiwulik (Baboquivari Peak)--began collecting Pima and Papago beans around 1910 and distributed them to farmers around the world. Some of these have been grown out at experimental farms over the years and kept in seed banks so they would not die out.

If you are looking for a special kind of seed that the Old People used to have, describe how it looked (seeds, fruit, leaves) and send a letter to the following addresses. They will try to help you.

Southwest Traditional Crop Conservancy Garden & Seed Bank
Meals for Millions/Freedom from Hunger Foundation/Southwest Program
715 N. Park Ave., Tucson, AZ 85719

National Seed Storage Laboratory USDA SEA
Colorado State University, Fort Collins, CO 80523

Germplasm Resources Laboratory USDA SEA
Building 001, Room 322 BARC
Beltsville, Maryland 20705

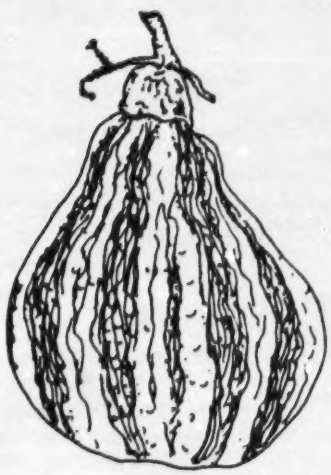
Seed Savers' Exchange
Rural Route 2
Princeton, MO 64673

Or write for catalogs of the following seed companies:

Plants of the Southwest
1570 Pacheco St., Santa Fe, N.M. 87501

Westwind Seeds, Apartment 139 (25¢ for list)
2509 No. Campbell, Tucson, AZ 85719

The Redwood City Seed Company (50¢ for catalog)
P.O. Box 361, Redwood City CA 94064



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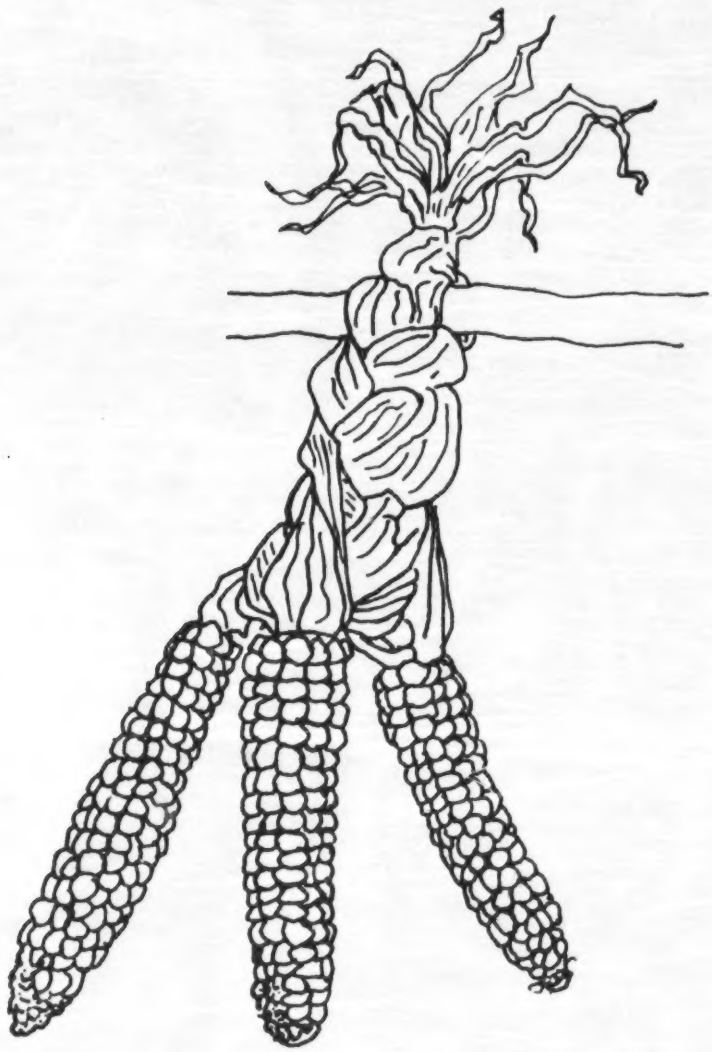

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